



Homework 3 Relational databases and normalisation

1. A boat hire company stores details of its customers, boats and rentals in a database. The relations in the database hold the following data:

Boat (BoatName, type, length, berths)

Customer (CustomerID, Surname, Firstname, AddressLine1, AddressLine2, Town, Postcode, DateOfBirth, email)

BoatHire (CustomerID, BoatName, HireDate, HireEndDate)

- (a) The key in the BoatHire relation consists of three attributes.

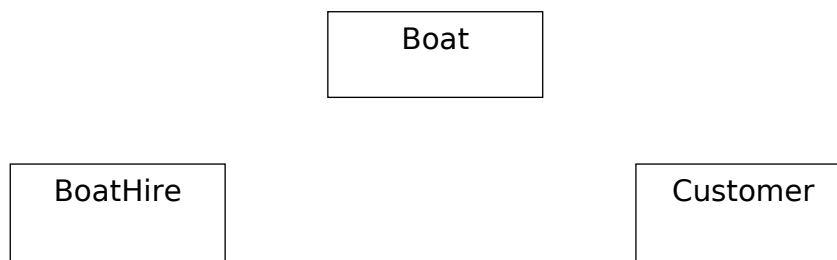
What is the name given to a key made up of more than one attribute? [1]

- (b) The relations in this database are in Third Normal Form.

State the properties of a relation in Third Normal Form. [3]

- (c) State, with reasons, why it is important that relations in a database are in Third Normal Form. [6]

- (d) Complete the Entity-Relationship diagram below to show the degree of the relationships between the entities. [3]





2. A database is to be created to hold data about students at a Sixth Form College and the subjects they study.

Students study a number of subjects, and each subject has one subject leader.

The table below is a first attempt at the design of the database.

StudentID	Name	TutorGroup	Tutor	Subject	Level	SubjectLeader
S1000	Bella	2	CKE	History Geography Economics	A A AS	AJH BJG CKE
S2000	Jane	3	KPR	English French Russian	AS A A	DRE FJF KPR
S3000	Greg	1	DRE	English Geography	A A	DRE BJG

- (a) Explain, with reference to the data, why the table is not in First Normal Form (1NF). [2]

- (b) The design is changed to:

Student (StudentID, Name, TutorGroup, Tutor)

StudentSubject (StudentID, Subject, Level, SubjectLeader)

Show how the data given in the table above would be held in these two tables. [3]

Table: **Student**

StudentID	Name	TutorGroup	Tutor

StudentSubject

Table:



StudentID	Subject	Level	SubjectLeader

- (c) A student is not allowed to study the same subject at A and AS Level. [1]
What is the primary key of the table StudentSubject?
- (d) The two tables Student and StudentSubject are related. Explain how this is achieved using a primary and a foreign key. [2]
- (e) Explain why the table StudentSubject is not in Second Normal Form (2NF). [2]
- (f) Explain why the table Student is not in Third Normal Form (3NF) [2]

[Total 25 Marks]